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ABSTRACT

Noting that one reason for the discrepant results found in research on reading difficulties is the variety of approaches used to assess reading and spelling problems, this paper examines two of these approaches in terms of their implicit assumptions and inherent failings. The paper first discusses the etiological approach, which tries to identify physical, environmental, and emotional factors that impede the reading or spelling process. The paper points out three difficulties with this approach: (1) a lack of criteria for differential diagnosis and the problem of overlap, (2) uncertainty of the direct causal relationship, and (3) the low and indirect therapeutic value of the approach. The paper next discusses the cognitive defect approach, which tries to isolate various types of reading problems. Among the shortcomings listed for this approach are the inadequacy of the assumptions about the process of reading underlying it and its implicit assumption that the cognitive functions are a unitary process. The paper concludes that a more fruitful attempt to identify variables in reading difficulties is the process-oriented approach, which tries to identify partial processes of reading in which children with reading problems are deficient and cites a number of studies that support the value of this approach. (FL)

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Paper presented at the Annual Meeting of the European Conference on Reading (2nd, Joensuu, Finland. August 2-5, 1981)

Renate Valtin

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The disabled readers: what are their weaknesses in language and in the reading process?

While it is generally agreed upon that reading disabilities are due to multiple causation, there is considerable disagreement as to which factors are more relevant and which remedial procedures are more promising.

There seem to be at least two reasons for these discrepancies: the concept of reading disabilities (or specific reading disabilitities, or "Legasthenie") and the variety of approaches that try to assess them. The concept of specific reading disability is a purely formal one and each researcher can more or less arbitrarily choose the operational definition and the criteria concerning the degree of reading retardation and the measure of intelligence. In Germany this issue becomes even more complicated by the fact that most of the researchers use spelling tests, or in some instances a combination of reading and spelling tests, as a diagnostic tool for "Legasthenie" Thus every researcher is free to choose an operational definition and select the criteria that will be used for the severity of the reading/spelling/writing disability and for the level of IQ. In this purely conventional concept of specific reading disability, research encounters a vicious circle. Working from an arbitrary and unclear diagnostic construct, the researcher attempts to discover the particularities of that construct or, expressed differently, an arbitrary diagnosis produces a necessarily arbitrary cluster of research results that vary according to criteria for reading or spelling disability, choice of diagnostic instruments, and selection of the investigative sample.

Most often the samples of poor readers are very heterogeneous with regard to the reading disabilities, a fact that is partly a consequence of the tests used for diagnosis. The diagnosis of "Legasthenie", at least in Germany, is based on standardized reading and spelling tests that refer to the relative position of an individual

compared with the norm group, but these tests do not provide reliable knowledge of the specific strengths and weaknesses in the reading or spelling process since they lack adequate criterion measures. Moreover, this diagnostic approach based on the normal distribution will always produce failures. What we need are criterion measures based on the theory of the reading and the spelling process.

Another reason for the discrepant results in research on reading difficulties seems to be the variety of different approaches trying to assess reading and spelling difficulties. Some of these approaches will be discussed in terms of their implicit assumptions and inherent difficulties and their usefulness to diagnosis and remedial and therapeutic teaching.

THE ETIOLOGICAL APPROACH

The etiological approach tries to identify physical, environmental, and emotional factors which impede the reading and/or spelling process. There seems to be at least three inherent difficulties of this approach:

1. Lack of criteria for differential diagnosis and the problem of overlap. Rabinovitch (1962), for example, categorizes reading problems into three major groupings: primary reading retardation, secondary reading retardation, and brain injury with reading retardation. But he admits very frankly that the criteria for differential diagnosis are still uncertain and "Despite the neatness of all our attempted theoretical formulations, I must confess that in practice our group not infrequently arrives at a diagnosis such as 'a secondary retardation with a touch of primary disability'".

2. Uncertainty of the direct causal relationship. As the marvelous interdisciplinary study of Robinson (1946) reveals, there was a lack of agreement among her group of specialists as to which factor caused the reading problem. There is no theoretical agreement whether these factors are causative, contributory, or merely coincidental to the reading retardation. We also lack practical evidence for a direct causal relationship. As Merritt (1971, p. 186) points out: "In the case of every factor that is supposed to contribute to reading disability, we can find a child who should be at risk who can read

perfectly well."

The research should look for the missing link, the mechanisms in which way these causative or contributory factors may affect certain reading subskills, and we need a fruitful theory of the reading process as a precondition for this.

3. Another problem of this approach is the low and indirect therapeutical value. Having diagnosed etiological factors as brain damage or poor home conditions, the teacher is unable to remove or correct these factors. Furthermore, this approach does not give any direct evidence for specific remedial instruction as we do not know the operating mechanisms and the points in the reading process where these factors lead to a disturbance. As Merritt (1971) puts it: "If a child's difficulty with orientation does owe something to a neurological deficit of some kind, we certainly cannot operate on his brain. Whatever may have predisposed the child to experience difficulty, the remedial problem consists of developing the appropriate learning sets. This is where more attention is really needed both for practical and theoretical reasons."

THE COGNITIVE DEFICIT APPROACH

The cognitive deficit approach tries to isolate various types of reading problems. Some researchers are looking for deficits of reading disabled children in various cognitive functions, such as visual and auditory discrimination, memory, and language. Again, there are many shortcomings of this attempt.

The assumptions about the process of reading underlying the deficit approach are inadequate. It is significant that in studies of this type one scarcely ever finds a definition of the reading process that goes beyond banal paraphrases (reading is making sense out of signs, or some such), let alone a discussion or proposal of a theory of reading. Authors seem to be content to list the skills that are used during reading and writing. Behind these studies lies the unexpressed assumption that reading is some sort of a product of a variety of cognitive functions (such as visual and auditory discrimination, language skills, memory and comprehension of symbols) whose undisturbed functioning guarantees reading achievement and

that reading will be impaired if one of these functions is deficient. That reading is a result of a specific learning and instructional process seems to be ignored in this model. Consequently, specific reading disability implies a specific causal attribution: the causes are primarily attributed to the child and his lack of capacities and not so much to the instruction process itself.

Most of the research on "Legasthenie" is based on this function model or reading-readiness model. Groups of poor and normal readers are compared in these functions and low achievement of backward readers is interpreted as a deficit that impedes normal progress in reading. The fallacy of this conclusion is obvious: correlations are interpreted as causal factors, although the design of the studies doesn't permit this.

Another fallacy of the deficit approach is the implicit assumption that the cognitive functions are a unitary process operating relatively independently of the stimulus material and the task so that a transfer effect from one task to another will take place (see also Scheerer-Neumann, 1977a). The underlying assumption seems to be that visual perception, for example, is a unitary psychic entity that the child possesses to certain degrees and that operates uniformly on all visual materials like pictures, geometric or abstract designs, numbers, letters, and words. Or that auditory discrimination operates uniformly on noises, musical notes, letter sounds, or words. Or that there is one directional ability equally effective in discriminating one's own body parts, body parts or other persons, objects in a two- and three-dimensional space or the sequence of letters in a word.

As various investigations have shown (Malmquist, 1958; Neisser, 1967) the visual processes are not unitary, but highly specific, and must be trained on different materials. A good discrimination ability in the pictorial domain does not guarantee the discrimination of letters and words. To learn to discriminate letters, the child must learn the specific distinctive features of the letters. Similar conclusions were reached about auditory discrimination ability by Dykstra (1966). Dykstra used seven independent tests of auditory discrimination with over 600 first grade pupils and reported that

the intercorrelations among these measures were consistently low, almost always below 0.40. The implication of these results is that auditory discrimination is highly test specific.

Based on the assumption of the uniformity of the cognitive functions, the function model also serves as a theoretical basis for remedial treatment. The deficient visual, auditory, and motor functions are trained by specific programs and the improvement of these functions, so it is hoped, will result in an improvement of reading (see for instance the Frostig program; Frostig and Maslow, 1973). There is neither theoretical nor empirical evidence for the validity of such a transfer. The numerous American experiments with visual training programs have not proven themselves helpful in increasing reading achievement (Valtin, 1972). Eggert, Schuck, and Wieland (1973) have stated that motor and cognitive-verbal training (that is, training in writing and functional exercises) resulted in very unspecific effects: both treatment groups showed improvement in both the trained and the untrained areas. Thus, the assumption of a transfer of such training programs is highly questionable.

Moreover, when one looks at the low correlations that have been obtained between the functions that have been tested and the reading achievement scores, the impression arises that factors have been measured that are rather irrelevant to the reading process. A further verification for this is that in longitudinal study (Valtin, 1972) scarcely any relationships worth mentioning were observed between reading and writing achievement in the first, second, and third school year and some variables measured at the beginning of school (visual perception, directional confusion, articulation, auditory discrimination, vocabulary, school readiness, IQ). Although the correlations between these variables and reading achievement were statistically significant, they were of no great practical value; for instance, individual predictions of reading failure were not possible.

Another objection against this approach is the circumstance that the observed deficits of the poor readers might be an artifact of the research method used. If we compare representative samples of good and poor readers, they will differ in background variables

such as intelligence and socioeconomic status and, consequently, they will differ in correlated psychological tests of visual, auditory, memory, or language abilities. Thus the poor readers will show many "cognitive deficits." But if we take into consideration the IQ of the poor readers and investigate only children with specific reading disabilities - individuals whose reading progress is unsatisfactory in terms of their potential - then the deficits will vary with the measure of potential ability we use (Verbal IQ, Performance IQ, or Full Scale IQ).

As Reed (1970) and Valtin (1978/79) have demonstrated, the IQ measures used to define the reading disability not only influence the pattern of the relationship between Verbal and Performance IQ but also the results in tests correlating with these IQ measures. If groups of poor and normal readers were matched on Performance IQ, the poor readers showed deficits especially in the language tests. If the Verbal IQ was chosen for the matching, the differences tended to disappear. When the Full Scale IQ was used as the matching variable, the poor readers showed better results in the visual tests and poorer results in the language tests. Similar results were obtained for poor spellers.

In the Valtin study the results varied even in those variables such as poor vocabulary, field dependence, poor auditory discrimination ability, difficulties in coding and symbol learning, and poor memory for digits which are frequently quoted as reliable deficits of reading disabled children (for details of this study see Valtin (1979) and Valtin/Jung/Scheerer-Neumann (1981)).

In summary, we can state that the acceptance of the etiological approach and the deficit approach has had two unfortunate consequences:

1. It has led researchers in a circle round about the reading process (in areas such as sociocultural milieu, dominance factors, early childhood development, personality characteristics) while we scarcely know anything about specific deficits in the reading process itself.

2. Since the method of matched pairs was chosen for data collection, the results - in respect to the recorded deficits - are not reliable and are possibly artifacts of the research design and the IQ measure used to define specific reading disability.

THE PROCESS-ORIENTED APPROACH

A more fruitful attempt to identify variables in reading difficulties is the process-oriented approach. This attempt is an alternative to the function model of reading. Researchers of this type try to identify partial processes of reading in which children with reading problems are deficient. They base their assumptions explicitly on a theory of the reading process.

At the present state of knowledge it seems reasonable to describe the reading process within a successive-stage information processing framework (for details s. LaBerge/Samuels 1974, Massaro 1977, 1978). Reading is a complex skill with different components which might be used in various ways by the reader, according to the purpose of reading, the difficulty of the reading task, the level of attainment or individual strategies. The fluent reader has mastered not only the different components at an automatic level but also their integration (Guthrie, 1973, has shown that the correlations between subskills were high for good but low for poor readers).

Two important components are word identification (based on data from the graphic level) and generating a hypothesis (based on data from the conceptual level). Perfetti/Roth (1980) suggest that "the two processes are at once interactive and asymmetrical. Top-down and bottom-up data are not used in strictly reciprocal ways. ... the so called bottom-up processes can carry on reasonably well without top-down processes but not vice-versa." Some skills in word decoding are a necessary prerequisite for generating a hypothesis.

The question whether poor readers are slow decoders and/or poor context users cannot be answered clearly on the basis of the present research studies. Some researchers (Perfetti 1977, Scheerer-Neumann 1978, Valtin, Jung, Scheerer-Neumann 1981) suggest that reading failure derives in large part from deficiencies in word decoding and identification. If the word identification process is too slow, the attention of the reader must be divided between the coding process and the processing of the whole sentence. Because of the constraints of our short-term-memory a low rate of word identification reduces the information which could be used for generating a hypothesis.

Table 1 presents a model of word recognition outlined by the German psychologist Scheerer-Neumann.

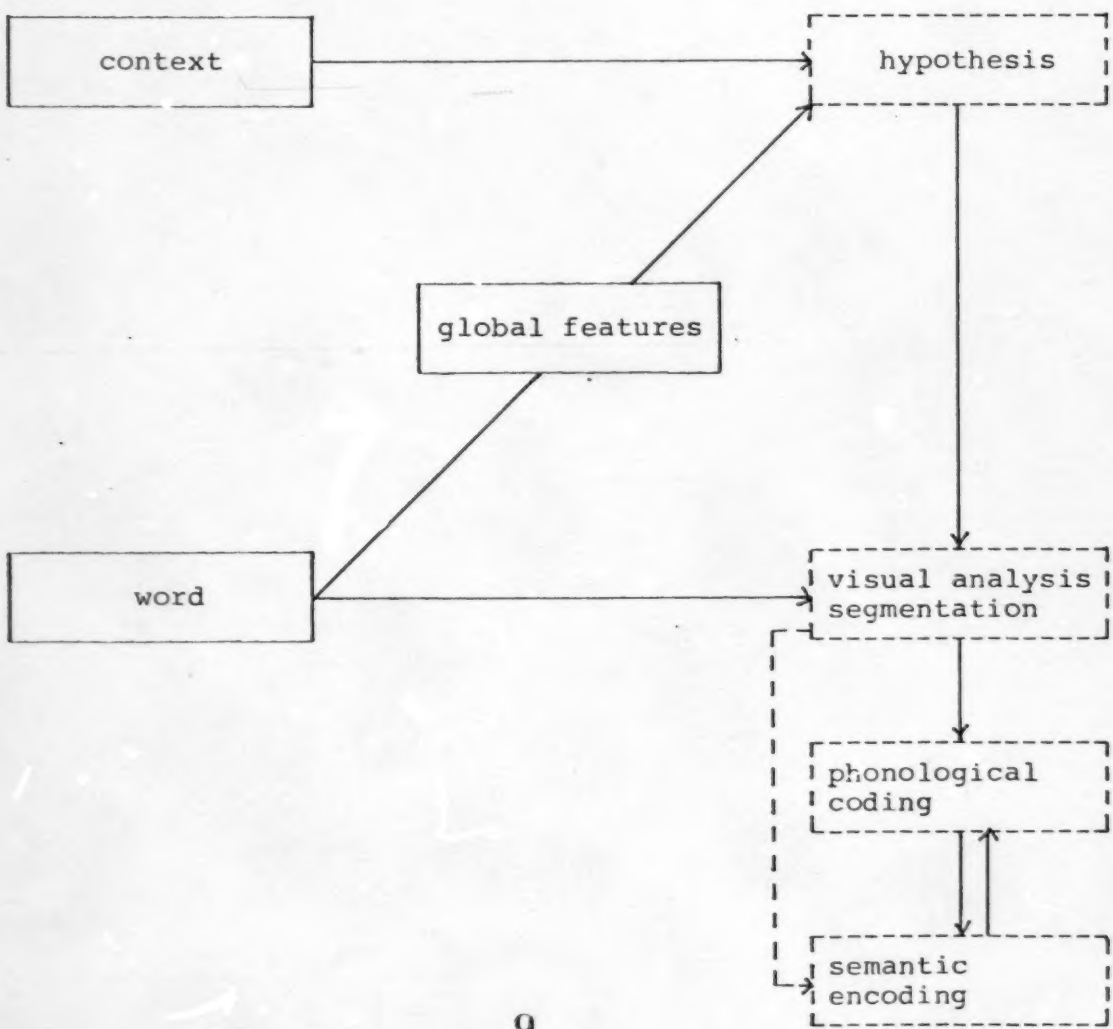

Table 1: A model of reading a word in a sentence context (Scheerer-Neumann, 1978)

This model allows the identification of partial processes which are disturbed in poor readers. According to this model three operations take place sequentially during the process of word identification:

1. The visual operation consisting of a distinctive feature analysis and a segmentation of the linguistic material into manageable chunks.
2. The phonetic recoding of chunks into a phonetic pattern.
3. The semantic decoding which can take place parallel or prior to the phonetic coding.

As Scheerer-Neumann (1977 ,p.134) points out, her reading model has to be refined by investigating mastery of the partial processes under three aspects: accuracy, speed, and automaticity. Interfacilitation among these processes is another aspect worth studying.

Visual operations: For being able to read, the child must know to analyze the characteristic visual features of letters. This is a specific ability not related with visual perception of figurative material as represented for instance in the Frostig Test (s. Valtin 1970, 1972; Oehrle 1975; Vellutino, 1977, 1979).

Scheerer-Neumann's studies show that poor readers have difficulties with the segmentation of words into economical units because they either try to read words as a whole or try to code letter by letter. In a tachistoscopic experiment (Scheerer-Neumann, 1979) the performance of good and poor readers in identifying eight-letter pseudowords of either first- or fourth-order approximation to German were compared (a e j n a r t e and p u l m e r a t).

Both groups showed better results with the more redundant pseudowords, but the difference between these two experimental conditions was much greater for the poor readers who could apparently not profit from the better segmentation possibility of the fourth-order pseudowords. Another study showed that the identification of pseudowords by poor readers could be improved when the stimulus material was segmented into syllables.

Still another study (Scheerer-Neumann, 1978) throws an interesting light on the reversal errors of poor readers, which within the

deficit approach are linked to a directional confusion. Using letter sequences ordered by chance, the poor readers were even better than the good readers in reporting the left-right sequence, but the good readers showed better results when letter sequences that could be segmented into chunks were used. Thus, it is apparent that the poor readers have internalized the left-right scanning process, but fail because of their uneconomical segmentation strategy. If the phonetic coding process operates on syllables (pul-me-rat), the order of the letters within the syllable is already fixed; but if one recodes single letters (p-u-l-m-e-r-a-t), it is far more difficult to keep the right order (Scheerer-Neumann 1978).

Phonological recoding: During the secondary recognition process the visual information is transformed into a higher-order code, speech, lexical or meaning (Massaro 1977, 1978). We assume that at the beginning reading stage recognition of written words is in the most parts mediated through phonological recoding including acoustic and articulatory properties. Phonemic awareness and phonemic synthesis skills (blending) are relevant at this point for learning and establishing spelling-to-sound correspondence rules, while there seems to be a reciprocal relationship between segmental analysis skills and learning of phoneme-grapheme-correspondences. The phonological code can be generated before and after the lexical access. There is substantial evidence now that fluent readers can bypass the phonological recoding and directly extract meaning from print - at least at the word recognition level (for a review s. Barron 1978).

It seems advisable to differentiate between decoding of words (identifying the semantic referents of words or word groups belonging together) and language comprehension (analyzing the semantic/syntactic properties of language and combining concepts into a meaningful unit). Phonological recoding has different relevance for word decoding and language comprehension. While this code can be bypassed in word recognition, some sort of speech code is indispensable for the processing of information in the working - or short-term memory (Barron 1978, Massaro 1978, Liberman/Liberman et al. 1980). In the short-term memory the verbally encoded information is

stored for several seconds while sentences are processed for meaning. Some studies indicate that good and poor readers do not differ in short-term memory capacity per se. In a study by the present author (Valtin 1972) poor readers compared with good readers with equal IQ showed similar results in a digit span test and a memory test for visual forms but inferior results with linguistic material. There appear to be differences in short-term language encoding and in the use of efficient encoding strategies such as verbal labeling and rehearsal (Perfetti 1977, Torgesen 1978-79, Vellutino 1977, Valtin 1970).

Liberman/Liberman et al. (1980) have provided evidence that poor readers do not rely on phonological strategies as such as good readers do since in tasks of recall of letters and words good readers were always penalized more by phonological similarity of the stimulus material. While these findings are not consistent with results of my own, they were supported by Frith (1978b). In a study with German pupils (Valin 1972) good and poor readers of similar IQ differed significantly in their ability to recall auditorilly presented words, but both groups had poorer results with phonetically similar (rhyming words. Frith compared 2 groups of children with similar reading ability but of dissimilar spelling levels and found that poor spellers relied to a lesser degree on a phonological representation. They consistently showed a weaker ability in converting letters to sounds in various reading tasks. Frith concluded: "This weakness is decidedly not a lack of ability, rather a lack of preference for, or an avoidance of, this aspect of reading" (Frith 1978b, p. 53).

To summarize, there seems to be substantial evidence that poor readers (poor spellers) show a lack of facile use of verbal code. While a lack of linguistic or phonemic awareness might contribute to a poor phonological encoding in reading and writing it must be investigated further if the lesser reliance on a phonological strategy is indeed related to poor phonemic segmentation skills or to a more general inefficiency in verbal encoding strategies. Phonological segmentation seems to be especially relevant for spelling. In various models of spelling the phonemic segmentation process plays a major role, at least in orthographies where the units that

are coded in written language are mainly phonemes. Nasarowa (1955) has demonstrated with Russian subjects that errors in spelling tend to increase if the speech motor processes are suppressed. Valtin (1972) reported that poor spellers performed significantly poorer in an articulation test. Studies by Frith (1978) and Valtin (in Valtin, Jung, Scheerer-Neumann 1981) have provided evidence for a dissociation between reading and spelling ability and that poor spelling ability can coexist with good reading ability (though not vice versa). Children both poor in reading and spelling showed more phonetic misspellings in the Valtin study, thus indicating poorer phonemic segmentations skills, as compared with poor spellers of normal reading ability. The reason for this dissociation between input (reading) and output processes (spelling) and the role of spelling-to-sound correspondence rules should be investigated further.

To summarize, difficulties in word decoding and in comprehending sentences may derive from poor segmentation of words, poor phonological decoding and poor verbal encoding. This points to the relevance of language factors in reading disabilities.

In comparing children with normal reading and spelling abilities and children who were both poor in reading and spelling the following results were obtained in various experiments (Valtin 1970, 1972, 1973, 1981). Poor readers/spellers showed the following language problems:

- lower verbal IQ
- greater occurrence of language disorders
- greater retardation in language development
- more errors in articulation of difficult words
- poor phonemic segmentation
- differences in the definition of words: poor readers/spellers used more descriptive and functional definitions while good readers/spellers used more abstract definitions in the sense of categorizations. But no differences were observed in the cognitive levels of categorizations in a test based on pictures of objects (Bruner).

- no differences in verbal output (as measured by number of definitions given in a vocabulary test, by the verbal expression test of the ITPA and in the length of utterances in an oral speech test). In the analysis of oral speech no differences were found in the basic structures of grammatical forms, as length of utterance, number of clauses or subordinated clauses, use of conjunctions, type-token-ratio , but there was a tendency for good readers/spellers to use more second order subordinated clauses.
- no differences in an association test measuring paradigmatic and syntagmatic responses.

An interesting result of one study (Valtin et al. 1981) was the fact that poor readers/spellers showed poor performance in a German auditory discrimination test (requiring comparison of two spoken words and judgment concerning likeness and differences) but normal results in the similarly constructed Wepman Test with English words. This result is in contradiction to the widespread assumption that specific reading disability is connected with poor auditory discrimination ability.

Similarly, Katz (1967) observed that English-speaking poor readers had greater difficulties in the auditory discrimination of English words than with Hebrew words and supposed the familarity with the words to be the critical factor. Another explanation also seems plausible: that good readers use a different strategy when presented with words of their native language. They might not rely only on the auditory stimuli but figure out the written form of the orally presented words, thus possessing more critical cues for the differentiation. With this strategy they have an advantage over the poor readers and spellers whose knowledge of the written forms of the word often is deficient. This hypothesis should be further investigated, however. According to this interpretation, the apparent discrimination disability of the poor readers and spellers is not so much a perceptual difficulty in discriminating speech sounds but a cognitive confusion about the nature of phonemes which do not have the same acoustic quality in all linguistic contexts (see Vellutino, chapter 16). Since phonemes are not always identical with the

acoustical units of a spoken word, the phonemes that are relevant for a particular alphabetic writing system must be learned by the pupils and cannot be identified only by hearing (auditory discrimination) or a good pronunciation of the words. This learning process may not be fully accomplished by the reading disabled.

Let me cite another example for my hypothesis that poor readers/spellers have adequate phonetic discrimination abilities. The German linguist Jung (1977) carried out a tricky experiment to show that phonemic discrimination is influenced by the orthographic knowledge of an individual. In the German language, long and short vowel sounds are represented by different orthographic rules. Jung constructed pairs of sentences, each which contained a verb with a short and a long vowel sound:

Die Schwalbe ist ein Zugvogel, weil sie nach Süden fliegt.
Der Schuster ist ein Handwerker, der kaputte Schuhe flickt.

These sentences were videotaped and some of the verbs were interchanged. Children with poor and normal spelling abilities heard the sentences and were asked whether the verb contained a long or a short vowel sound. Most of the good spellers did not notice the manipulation of the verbs and gave the right answer in respect to the orthographic representation of the sound, while more of the poor spellers noticed the manipulation. Obviously, the poor spellers relied on the acoustic signal while the good spellers referred to the written form of the word. Thus the orthographic knowledge influenced their phonetic judgment.

To summarize, the findings reported here indicate that children with poor reading and spelling abilities possess adequate perceptual discrimination abilities, but lack phonemic awareness, especially the ability to segment words phonemically.

In one of my studies (Valtin 1972) poor readers/spellers showed normal results in segmenting words into syllables, but had difficulties in segmenting at a phoneme level. This result is in agreement with other findings that the syllabic segmentation is easier than the phonemic segmentation (Goldstein, 1976; I.Y. Liberman, Shankweiler, Fischer & Carter, 1974). This inability to segment words into phonemes is an explanation for certain errors in spelling:

errors that are not phonemically accurate. Since children with reading and spelling difficulties in general are able to write letters after dictation (Valtin, 1970), these phonetic errors in spelling cannot be attributed to poor sound-letter conversion skills alone but they seem to indicate a failure in the accurate phonemic segmentation of the word.

In the Berlin study (Valtin, 1978/79, 1981) the spelling errors of the sample were classed into two broad categories: phonemic errors, which distorted the sound pattern of the word, and orthographic errors, which were phonemically accurate but violated specific orthographic rules. In the factor analysis of all administered tests six factors were extracted:

F_1 Inability to segment words phonemically (with loadings in all phonemic misspelling categories as letter omission, letter insertion, vowel and consonant substitution, and reversal and translocations of letters)

F_2 Orthographic rule knowledge

F_3 With the only loadings in the two auditory discrimination tests

F_4 Verbal knowledge (with a loading in the silent reading test)

F_5 A numerical factor

F_6 A visual-spatial factor

This factor analytic study has indicated that auditory discrimination is, in fact, independent of phonemic segmentation ability. Another finding of this study supports this argument: children with poor auditory discrimination skills did not show more phonemic errors in their spellings. This casts doubt on the widely accepted hypothesis in Germany that phonemic errors are an indicator of deficiencies in auditory perception.

An experiment conducted by Bailey (1979) yielded results which also questions the importance of auditory perceptual factors in reading. The study investigated the effect of an auditory training program with backward readers, seven to nine years of age. While the auditory skills that were trained in the program (auditory discrimination, auditory analysis and synthesis) improved significantly, there was no corresponding improvement in reading (word recognition and comprehension). Bailey suggested that normal readers acquire the skills of enunciating phonetic sounds correctly and of phonemic segmentation as they learn to read - as an effect of the actual teaching of reading.

In my opinion the language problems of poor readers/spellers do not refer to an automatic level of language usage (and if so only in a very few instances) but to a more abstract level: the ability to consciously and internally operate with language. This assumption is an agreement with the hypothesis of several researchers who suggest that reading problems may derive from a lack of linguistic awareness (Bosch, 1965; Mattingley, 1972; Downing, 1977; Gleitman/Rozin, 1973; Golinkoff, 1978; Liberman/Shankweiler et al., 1974).

Linguistic awareness may be defined as the explicit knowledge of the linguistic structure of a language, in particular of those features which are represented by the orthography of a specific language. It is in part a function of the knowledge of the orthography and dependent on specific instruction. All the linguistic features which are represented in a given orthography must be aware to the user of this orthography (sentences, words, morphemes or phonemes. In German it is also necessary to be aware of different types of subordinated clauses since they are marked by commas). The phonemic awareness seems to be the most difficult. This is not only demonstrated by the fact that alphabetic systems have been developed rather late in the history of mankind but also by studies with preschool children indicating that the ability to segment sentences into words or words into syllables emerges much earlier than the ability to segment words into phonemes (Liberman et al. 1974; Golinkoff 1978). While words or syllables can be presented in isolation without loosing their acoustic identity this is not possible with phonemes: "Phonemes

are not represented in the acoustic signal in discrete segments but rather are merged - 'encoded' - into larger units of approximately syllabic size" (Liberman, Liberman, Mattingly, Shankweiler 1980). Because the speech signal is continuous and highly dependent not only on contextual variations but also on individual pronunciation patterns there are no acoustic criterion by which one can segment the word into its phonemic components. While speech refers to the phonetic level written language (at least in the German orthography) refers mainly to the phonological level. According to German linguist (Eichler/Bünting 1976) a German adult speaker produces in his speech about 120 - 150 perceptually discriminable speech sounds. But only 38 - 40 phonemes have the function of indicating to a difference in meaning. The child must learn what class of speech sounds corresponds to a specific phoneme. As Read (1975) has demonstrated American children use other categorizations of speech sounds than adults. A good pronunciation or a precise hearing will not lead a child to learn a phoneme. Many reading teachers employ these methods however and some learning to read programs in Germany are based on this principle. My argument is that learning a phoneme is not a perceptual discrimination task but a cognitive task: the ability to deal with phonemes as abstractions and phonetically arbitrary classifications. Poor readers seem to have remarkable difficulties with this task. A certain degree of syntactic awareness appears necessary for reading comprehension. The conscious use of syntactic cues as sources of contextual information may facilitate the identification of individual words (at the word decoding level) and the synthesis of linguistic information in order to reconstruct the relationship between different concepts in a sentence (at the comprehension level). As Russian studies indicate fluent readers use their grammatical knowledge to identify "key words" or relevant semantic units and to combine them into a meaningful whole. Visual imagery, verbal encoding or auditory images of these key words seem to support these analytic-synthetic processes (Kostjuk 1969, Sokolow 1969, Weigl 1974).

There seems to be substantial evidence that poor readers experience difficulties in consciously applying their grammatical knowledge (Angermaier 1974) and in using syntactic information efficiently (for an overview s. Vellutino 1979, p. 287-289).

Several studies carried out or reported by Ryan (1980) yielded significant correlations between reading and grammaticality intuitions and sensitivity to sentence structures as well as poorer performance of less skilled readers in tests of linguistic awareness. Correlational studies, however, do not allow conclusions regarding causal relationships. Experimental studies combined with longitudinal investigations are needed to clarify the direction of causation.

Coming back to the reading model outlined in table 1, up to now we have only regarded the word identification process and suggested that the major difficulty experienced by the poor readers is their limited ability to decode words. For reading passages (words in larger contexts) other language and cognitive skills are involved. In this respect a differentiation of skills suggested by Merritt (1975) seems useful. He distinguishes between intermediate reading skills, or the ability to profit from contextual cues, and higher order comprehension skills. The intermediate skills, or "the ability to anticipate or predict that certain letters, word classes, word forms, meanings, or actual words are more or less likely in a given context" facilitate the recognition of unfamiliar words, understanding of word and sentence reading, and fluent reading (Merritt, 1975).

The present findings do not support the hypothesis of the psycholinguistic-reading frame work that poor and younger readers are less proficient in context use and that there exists a type of reading disability due to poor use of contextual information. Some recent experiments (Scheerer-Neumann 1979, Schwantes et al. 1980, Perfetti/Roth 1980, West/Stanovich 1978) have shown that poor and/or younger readers show a greater reliance upon contextual information than good and/or older readers. While being sensitive to contextual cues experienced readers obviously have reached automaticity in word recognition to such a degree that they don't need to rely on contextual information in order to facilitate the word identification process. Thus, poor readers seem to be able to benefit from contextual information when identifying a word and their slow rate of word decoding may be compensated by context effects (Perfetti/Roth 1980). Miscue analysis of reading errors (Thompson 1978) also yielded that poor readers made more errors at the level of graphic and phonemic analysis rather than at a semantic and/or syntactic level.

Perfetti/Roth (1980) observed that poor readers showed more errors in generating context cues in oral tasks. This difficulty may be due to a lack of active structuring of concepts and schemata or, again, point to difficulties of poor readers in dealing with language on an abstract level.

Another skill involved at this intermediate level of reading is text-organization or the ability to make use of units larger than a word in reading. Golinkoff (1976), in a review of studies on good and poor comprehenders, cites evidence for a lack of text organization of poor comprehenders. Studies with the eye-voice-span (EVS) show that the EVS for good readers usually is 14 letter spaces (or about 2 words), while the EVS for poor comprehenders is about 9 letter spaces or a little more than a word. Golinkoff concludes "the preceding studies characterize the poor comprehender as concerned with decoding each word and failing to utilize the interword relationships that could speed up the decoding process and permit more efficient text sampling" (p. 646).

A further differentiation by Cromer (1970) of the poor comprehenders into deficit and difference types seems most plausible. Due to a lack of some ability, for instance poor vocabulary skills, the deficit type of poor comprehender displays poor comprehension abilities. The difference type of poor reader has not yet achieved the right strategy: he reads the text word-by-word and does not organize the text into meaningful units. The difficulty of the deficit type seems to be a generally inadequate language comprehension skill, while the problem of the difference type is one of text organization. This assumption is confirmed by Cromer (1970) who demonstrated that the difference type of poor comprehenders could improve their comprehension ability when the presented text was organized into meaningful units.

We still lack data about the higher order comprehension skills referring to the ability to deal with larger units of meaning whereby the material can be differently used according to the purpose of the reader:

Literal comprehension (ability to select relevant details, perception of main ideas and understanding of their structure)

Inferential comprehension (ability to make inferences about implicit meaning)

Evaluation and critical appraisal of the reading material (cf. Merrit 1975)

It is obvious that the comprehension skills are directly related to the differentiation and complexity of the concepts, the cognitive organization, the general level of cognitive development, and the cognitive style of an individual.

Since the general topic of this conference-session is minimum level for full participation I would like to stress the point that the two reading components mentioned above (word decoding and understanding passages) are not sufficient for a full competence level. Full participation requires not only reading in the sense of pronouncing and understanding words (and writing in the sense of spelling words) but the ability to deal with written language whose difference to oral language is often neglected. Written language can be characterized as syntactically more complex and compact, explicit, more abstract and independent from situational context while speech (and especially the speech of the beginning readers) is highly concrete, implicit and bound to specific situations. A recent experiment (Valtin/Dovifat Thomalla 1981) shows that young children have difficulties in judging messages in oral communication.

The study employed a clinical-interview method to examine children's recognition and verbalizable knowledge of rule violations in communication. Thirteen film scenes were developed, each containing a two party communication where one participant shows inappropriate behaviour because of rule violation.
In one film a girl (Katja) is asked by her friend Michi to retell a tv-story she had seen. Katja gives a report with many pronouns and demonstrative adjectives which do not clearly indicate to what they are referring. The report can't be understood. The five year old children did not understand the situation and that Michi was unable to grasp the incoherent report of Katja. Interestingly, they all said that they themselves had understood the report of Katja. These results are in agreement with findings by Piaget on verbal communication (1926). In Piaget's experiment a child had to retell a story and to explain a mechanical object to another child. The younger speakers (6 and 7 years old) used verbalizations which were alike to Katja's report (undefined pronouns and demonstrative adjectives, omissions of relevant parts). Even under these circumstances the same year old listeners in Piaget's study nearly always felt quite confident that they had understood what the speaker said. Piaget explains this fact by the concept of distorted assimilation: the listener is unable because of his egocentrism to make a critical

26 children, 5 to 8 years old, were interviewed individually after having seen the film.

evaluation of the message itself and assimilates the statements to his own schemes, elaborates on them and feels confident that he has understood. Nearly all of our 5 year old children showed this behaviour. The majority of the six year old children of our study said that they did not understand what Katja said, but they could not say why. Most of them, however, thought that Michi understood the report. Si, 6 year old girl said: "Katja made a fine report. But I could not understand. I am so forgetful." Jo, 8 year old boy, after being asked if Katja had told the story well or badly, answered: "Well. That I cannot say that she told the story badly, that it was badly told." He himself, however, had not understood the film: "Perhaps I am too young for that, perhaps it is only for 10- or 12 year olds". Twelve children recognized that the story of Katja was not well told but two of them had difficulties to explain why. Ke, 6 year old child, said: "Katja spoke so unintelligibly ("undeutlich"), she should speak as we do, we don't speak unintelligibly." - Asked to give an example of how "we speak" she told a film she had seen one day: "I saw a film where a man was and he was on a ship. And they (!) went away, and the woman (!) saw the man, and she helped him, the man, to lay this, the planks." Ke.'s report itself is a nice example for context-bound speech. While she recognized - herself in the role of the listener - that Katja's report was not understandable, she was not able to take the role of her listener and to judge that her report also was unintelligible. Another boy, 7 years old, said: "Katja didn't speak clearly, so Michi didn't understand it." E asked if he himself had understood the film and he said: "Yes, but I knew the film."
In this study, mainly the 7 and 8 year olds could clearly designate the communicative fault and give the explanation for it.

The results of this experiment clearly indicate that beginning readers still have difficulties in evaluating oral messages and certainly will experience still more problems in dealing with written language where - with regard to abstract contents - formal operations in the sense of Piaget are required. The school should foster the ability to deal with abstract language and develop formal problem-solving skills. While this is a formal aspect, Rudolf Bahro in his challenging book "Die Alternative" (1977) has outlined specific goals for full participation. He postulates "die Eröffnung des unbeschränkten Zugangs zu einer Natur und Technik, Gesellschaft und Künste umfassenden Allgemeinbildung höchster ('universitärer') Stufe für alle" (325), so daß "die Menschen positiv in die Lage versetzt werden, ... sich die Quintessenz der Gesamtkulturleistung subjektiv zu eigen zu machen" (Bahro, 1977, 302).

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